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ARTICLE

How Children With Special Needs Travel With Their Parents: Observed Versus Reported Use of Vehicle Restraints

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ABSTRACT

OBJECTIVES. The difficulties entailed in transporting children with special physical and behavioral needs could influence child restraint misuse and nonuse within this population. Although parental interview is often used to assess child vehicle restraint use, little research had been performed to validate this approach, and none has been done in the special-needs population. The objectives of this study were to assess the prevalence of nonuse and misuse of child restraints in the special-needs population and to assess the validity of using parental report as a measure of child restraint use.

METHODS. Restraint use in 115 children with special needs, aged 0 to 18 years, was observed on their arrival at the parking lot of the Alyn Hospital Pediatric Rehabilitation Center in Jerusalem. The observation noted type of restraint used or absence thereof. If a restraint was used, correct use/misuse was recorded. In 94 cases, the parents were interviewed later that day in the clinic.

RESULTS. Seventy percent of the children were observed as traveling unrestrained or with a restraint that was grossly misused to the extent that it provided no meaningful protection. The remaining children were observed displaying a variety of errors in the selection or use of the restraint that compromised their safety to varying degrees. Analysis of the observation results versus parental reporting revealed a 44% overreporting of child restraint use. Sensitivity was 71%, and specificity was 86%.

CONCLUSIONS. The high prevalence of restraint nonuse and misuse within the special-needs population defines this as a population at risk and emphasizes the need for intervention. Cautious interpretation is required of information acquired from parental reporting of child restraint use. The results of this study should raise awareness among professionals working with children with special needs as to the need for tailored assessment and intervention in the area of child-passenger safety.

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Key Words
child-passenger safety, special needs, validity, car seats, disabilities

Abbreviations
CRS— child restraint system
OT— occupational therapy
CPS— child-passenger safety
PPV—positive predictive value
NPV—negative predictive value
SES—socioeconomic status

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A CONSIDERABLE BODY of research created during the past decade relating to child restraint system (CRS) use within the general population has documented high percentages of child restraint misuse.[1–3] It can be postulated that the difficulties involved in restraining children with special medical, orthopedic, neuromuscular, and behavioral needs may lead to an even higher proportion of misuse, and possibly nonuse, in this population.

Transporting children with disabilities is complex, and the subject is largely unstudied. Surveys regarding the transportation habits of children with special needs are few,[4] and some are based on reported behavior. They indicate that these children are at higher risk of injury in case of a crash than are typically developing children. This is because of both the innate physical characteristics of this population, as well as the lack of knowledge among transporters, leading to unsafe modes of transportation. In fact, the lack of information has been found to be one of the underlying reasons for parental concern about the travel conditions of their children with disabilities.[4–9]

Surveys of reported safety practices are frequently used in injury research, and self-reported safety behavior is often used as an outcome measure in studies that evaluate the effectiveness of prevention interventions.[10] Well-designed observational studies are time consuming and expensive, whereas interviews, by telephone, in person, or by self-administered questionnaires may be a more efficient way of obtaining information.[11] However, self-reported safety practices may not accurately estimate safe behavior.

A review of the literature regarding validation of reported vehicle restraint use finds few studies that compare observed child restraint use versus parental reported use and none within a special-needs population. A Canadian study found a 38% parental overreporting of child seatbelt use among observed children entering the parking lot of a children's hospital whose parents were later interviewed by telephone.[12] In a similarly designed study in Australia, the observation was conducted as the children were being driven to preschool. This study found a percentage agreement score of 75%, with a low sensitivity of 27% and a high specificity of 99%.[13] In another study, observed and reported details of car seat use were compared among parents attending car seat checkup clinics in the United States. This study also found a relatively high specificity (>80% in most items), but for nearly every item, a lower sensitivity, ranging from 33% to 74%.[14] In addition, the literature highlights the phenomenon of increased overreporting in populations with low restraint use.[11,12,15,16] The objectives of this study were to assess the prevalence of nonuse and misuse of child restraints in the special-needs population and to assess the validity of using parental report as a measure of child restraint use in this population.

METHODS

Study Population

The study population included 115 children with special needs. Inclusion criteria for participation in both in-vehicle observation and parental interview were aged 0 to 18 years, attendance in the multidisciplinary outpatient clinics of the Alyn Hospital Pediatric and Adolescent Rehabilitation Center in Jerusalem, and participation in the clinic's occupational therapy (OT) evaluation. Exclusion criteria included children who arrived via public transportation and children who arrived accompanied by someone other than a parent (a parent will, from here on, be referred to in the masculine regardless of whether the mother or father was the study participant).

Ninety-four children met all of the inclusion criteria. An additional 21 children were observed in their vehicles but did not meet the third inclusion criteria of participation in the OT evaluation on the day of the clinic, and, thus, the parents of these children could not be interviewed. These 21 children were only included in the part of the study evaluating prevalence of restraint use and misuse. No significant difference was found between diagnostic categories or sociodemographic characteristics (age, ethnic origin, religion, and parental age and level of education) of the children who only participated in the observation as compared with the children whose parents were also interviewed. Sample size was calculated to detect a difference in reported versus observed behavior of 40%[12] with an α value of .05 and a power of .80.

The response rate of parents approached for observation of their child was 96%. Among those parents who did not agree to participate in the study, the reason usually given was that they were late for their clinic appointment. One-hundred percent of the parents who were asked to be interviewed, agreed. This study was approved by the hospital's ethics committee.

Data Collection

Observations were conducted by occupational therapists who were trained as child-passenger safety (CPS) technicians or technician instructors.[1] The observations were conducted between June 2004 and February 2005 on mornings when multidisciplinary outpatient clinics were held. The observer received a list of children scheduled for the clinic on the given day. All families were stopped as their car arrived at the rehabilitation center's parking lot, and the observer determined whether the child in the vehicle was on the clinic list. If so, the parent was given a brief explanation regarding the study and was asked to sign an informed consent form. In consideration of the center's multiethnic population, translation services were provided as needed.

The observation tool was based on checklists used by

CPS technicians,[1] providing face and consensual validity.[17] This form included information on the child's age and weight, seating position in the car, use or nonuse of a restraint, and characteristics of the vehicle that the child arrived in. In addition, it listed the different components of child restraint use, noting correct use or misuse of each of the components. Information on the use of orthopedic or medical equipment, travel while seated in a wheelchair, seat belt use, and lack of restraint use was included. Correct use was defined as use of the restraint according to the manufacturer's instructions and National Highway Traffic Safety Administration curriculum[1] instructions. Misuse was defined as any deviation from these instructions. Gross misuse was defined as a child sitting in a CRS not anchored to the vehicle's seat by a seat belt and/or a child not restrained by the internal harness of the CRS system, a child sitting in a wheelchair anchored to the vehicle and the child not restrained by the passenger portion of the restraint, or a restrained child sitting in a wheelchair not anchored to the vehicle. Interrater reliability for observation, based on a comparison of the ratings of 5 children by 2 observers, was 100%.

Reported data were collected in the form of parental interviews during the OT evaluation conducted as part of the multidisciplinary clinic. The occupational therapist in the clinic was blind to the observer's earlier data collection. Data regarding reported behavior were collected using a structured interview based on a closed questionnaire that mirrored the items noted by the observer. Demographic information was added to this form, as well as information regarding distance traveled to the center and information regarding the child's medical and orthopedic condition. If the family indicated restraint nonuse, an open question was added inquiring as to the reason for nonuse. Interrater reliability for interview, based on the comparison of the ratings of 4 parents by 2 interviewers, was 95%.

After the survey, participants received a letter including CPS information and an invitation to participate in individual hands-on CPS instruction. When possible, this instruction was provided on the day of the clinic visit after the completion of the observation and interview.

Data Analysis

Observed results were selected as the best available measure of restraint use for the study of validity. Sensitivity was defined as the proportion of unrestrained children who are reported by their parents as unrestrained. Specificity was defined as the proportion of restrained children who are reported by their parents as restrained. Positive predictive value (PPV) was defined as the likelihood that the child is not restrained when the parent describes him as not restrained. Negative predictive value (NPV) was defined as the likelihood that the child is restrained when the parent describes him as restrained. The percentage of overreporting is the likelihood that the parent describes their child as restrained when they are, in fact, not restrained. Percentage of agreement was defined as those whose positive and negative answers coincide, as a percentage of the total population. In all of the calculations, gross misuse and nonuse were reported as 1 category, as gross misuse indicates a level of protection equivalent to nonuse.[18] For all of the calculations, level of significance was defined as $P < .05$. Analyses were conducted using SPSS 13.[19]

RESULTS

Characteristics of the Study Population

Sociodemographic characteristics of the study population are presented in Tables 1 and 2. There were more male than female children, with more than half <10 years of age. Close to half of the parents had not completed 12 years of education, and slightly more than half the population was Arab.

Thirty percent of the children in the study population were diagnosed with spina bifida, 37% with traumatic brain injury or cerebral palsy, and 23% with neuromuscular disorders. Just more than half of the children weighed ≤18 kg. Ten children were observed traveling while wearing a reciprocal gate orthosis, 8 children were wearing a thoracic lumbar sacral orthosis, and 2 were transported with an oxygen supply unit.

Restraint Use/Misuse

Half (50%) of the children were observed in the vehicle with no restraint at all. This included 56 children who were unrestrained on the vehicle seat and 2 who were unrestrained in wheelchairs (Table 3). Most (89%) of the children observed were sitting in the back seat, and the remainder were sitting beside the driver.

The inclusion of children in a grossly misused CRS in the "no restraint" category (as explained in the definitions of variables) brings the number from 58 to 80 children (~70%) in this study who were observed as

TABLE 1 Sociodemographic Characteristics of the Study Children

Characteristic	*n*	%
Child's gender		
Male	69	60.0
Female	46	40.0
Total	115	100.0
Child's age, y		
0–4	37	32.2
5–9	34	29.6
≥10	44	38.3
Total	115	100.0
Ethnicity		
Jewish	55	47.8
Arab	60	52.1
Total	115	100.0

TABLE 2 Sociodemographic Characteristics of the Study Parents

Characteristic	Mother		Father	
	n	%	*n*	%
Age, y				
<29	12.1	11	26.6	25
30–39	35.2	32	36.2	34
40–49	39.6	36	31.9	30
≥50	13.2	12	5.3	5
Total	100.0	91[a]	100.0	94
Education, y				
<11	47.8	43	41.5	39
>12	52.2	47	55.3	52
Total	100.0	90[a]	100.0	91[a]

[a] Missing values.

TABLE 3 Use and Mode of Vehicle Restraint

Restraint Device	*n*	%
None	56	48.7
Child restraint system	26	22.6
Infant seat	5	4.3
Car seat	18	15.7
Booster seat	3	2.6
Special-needs restraint	0	0
Seat belt	29	25.2
Lap belt	4	3.5
Lap/shoulder belt	25	21.7
Wheelchair	4	3.5
Use of tie-down system	2	1.7
No use of tie-down system	2	1.7
Total	115	100.0

traveling without restraint protection. The gross misuse occurred both among the CRS users and wheelchair tie-down system users. Of the 35 children (30% of the total study population) who were restrained, all displayed misuse either in choice or use of the restraint, compromising their safety to varying degrees.

Report Versus Observation

The proportion of children accurately reported as restrained (specificity) was higher than the proportion of children accurately reported as unrestrained (sensitivity). Slightly more than 50% of the time, a parental report of restraint use was an indication that a restraint was indeed used (NPV). Most of the time, when a parent said that he did not use a child restraint, this was indeed the case (PPV). Forty-four percent of parents overreported restraint use (Table 4).

Reported Reasons for Nonuse of Child Restraints

Almost one third (32%) of the parents who provided reasons for reported nonuse of child restraints described physical and behavioral needs that precluded use. Other reasons given were less related to the child's special needs but rather reflected parental knowledge, beliefs, and economic barriers to restraint use (Table 5).

TABLE 4 Validity of Parental Reporting of Restraint Use in Relation to Observation

	Observed Restraint Use, *n*		
	Unrestrained	Restrained	Total
Reported restraint use			
Unrestrained	47	4	51
Restrained	19	24	43
Total	66	28	94

Overreporting is 19 (44.2%) of 43; percentage agreement is 47 + 24/94 (75%); sensitivity is 47 (71.2%) of 66 (95% confidence interval: 62.3%–80.4%); specificity is 24 (85.7%) of 28 (95% confidence interval: 78.6%–92.7%); PPV is 47 (92.1%) of 51 (95% confidence interval: 87.2%–97.2%); and NPV is 24 (55.8%) of 43 (95% confidence interval: 45.8%–65.8%).

TABLE 5 Reported Reasons for Nonuse of Child Restraints by Reported Nonusers

Reason	%
Economics	41
Lack of money to purchase car seat	
Car seat is expensive	
Child characteristics and behavior	32
Child cries when restrained	
Child refuses to sit	
Child removes seat belt	
No appropriate restraint available	
Parental knowledge and beliefs	27
Did not know restraint is needed in rear seat	
Nothing can happen	

DISCUSSION

Use/Misuse

The high percentages of lack of restraint use and restraint misuse found in this study indicate that almost all of the children surveyed would be at high risk for injury in a motor vehicle crash. The identification of children with special needs as a group at risk for injury in motor vehicle crashes is important for public health action aimed at designing and implementing intervention strategies for this group. As emphasized by parents who commented on why they did not restrain their children, children with special physical and behavioral needs provide a challenge even for safety-minded parents who wish to restrain their children but who do not always have the proper tools. Indeed, several cases were observed of parents, particularly of older children, who improvised a solution to provide their child with a means of sitting in the car. These solutions were not safe but were the best that the parent could do with the information they had.

Another factor that may have contributed to the high proportion of nonuse found in this study is the low socioeconomic status (SES) of the study population. SES, often measured by education, income, and/or occupation,[20] has, in general, been found to be positively associated with safety behaviors and, in particular, with restraint use.[4] Possible explanations for the direct relationship between SES and safety behaviors and the in-

verse relationship between SES and childhood injury include the influence of low parental education on safety knowledge. In addition, the cost involved in purchasing safety devices may serve as a deterrent for low-income families.[20,21]

The percentage of misuse found in this study is in line with the literature surveying the general population. Studies using similarly detailed and sensitive tools to those used in this study, at car seat checks, also find high rates of misuse, despite the high awareness about the importance of CRS use in those study populations.[14,22,23] Two studies focusing on low SES populations found proportions of nonuse that were even greater that those found in the present study.[24,25]

Parental Report Versus Observation

The present study found 44% parental overreporting of child restraint use. This, as well as the percentage agreement score, is similar to findings in studies in the general population.[12,13] In the present study, as in the literature, sensitivity was lower than specificity. The high PPV indicates that a parental report of lack of child restraint use may be relied on as accurate, whereas a report of child restraint use may not be accurate.[13,14]

In light of the literature regarding increased overreporting where there is low restraint use,[11,12,15,16] the high level of overreporting found in this study may be expected considering the low prevalence of restraint use. This phenomenon may be because of the tendency for people to often report restraint use whether true or not. When the actual prevalence of restraint use is low, there will be more people available to give a false answer, and, therefore, the proportion of overreporting is higher.

Why do parents report something that is not true? One reason cited in the literature is the tendency to give a socially desirable response, that is, a response in accordance with what a good parent would do.[12,13,15,16,26] In the present study setting, parents were interviewed by a professional with the status of an authority figure from whom they receive care. The parent may want to seek approval from the authority figure and be seen as a "good parent." Alternatively, the parent may want to finish the interview quickly without being delayed by an explanation of why he should be restraining his child. He may feel that he knows the official line on the topic but that he is not personally convinced of the importance of child restraint use in its absolute sense or in the context of all of the other tasks required in caring for a child with special needs. Another plausible explanation is that the parent is answering the question in relation to how he knows he should transport his child or would like to transport his child or in relation to how he sometimes transports his child. As pointed out in the literature, parental recall of events is reinforced, among other things, by their view of the world and how they think things should be.[26]

There was a small percentage of parents whose children were observed as restrained but who reported lack of restraint use. The lack of coordination between the parent responsible for the child's care in the car and the parent who answered the interview questions may provide us with an explanation for this finding.

It is possible that parental knowledge of observation of their child in the vehicle could have biased the results of the subsequent interview. Although foreseen as a possible study limitation, the observation/report sequence used in this study seemed to be the best alternative, because observation as the child arrived in the morning gave the most accurate indication of restraint use. There is some additional evidence in the literature regarding the existence of overreporting even when the individual knows that his behavior has been observed.[11,27] If a bias does exist in this study, then an even higher degree of overreporting exists in reality as compared with the high percentage found in this study, emphasizing the inaccuracy of using parental reporting as a measure of child restraint use.

This study has some limitations. The study population was confined to children treated at 1 center. Israel is a small country with few centers providing the services provided at the study center. It is estimated that ~70% of children in Israel with complex disabilities resulting from a variety of diagnoses are treated at this center, allowing the results to be generalized. Nevertheless, additional research is needed to confirm the ability to generalize from the findings to other populations.

CONCLUSIONS

The present study provides important baseline information regarding restraint use and misuse for children with special needs. The high prevalence of restraint nonuse and misuse in the special-needs population defines this as a population at risk and emphasizes the need for tailored intervention. The barriers to restraint use and correct use that are particular to this population must be taken into account when planning effective intervention.

The high percentage of parental overreporting of child restraint use requires us to cautiously interpret information acquired by parental interview and points to the limitations of using parental reporting as an indicator of individual child restraint use and as an estimate of population restraint use for policy planning. It highlights the need for objective observational evaluation, despite this being costly and time consuming.

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